Before the
**FEDERAL COMMUNICATIONS COMMISSION**
Washington, DC 20554

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| In the Matter of | ) | |
| | ) | |
| Restoring Internet Freedom | ) | WC Docket No. 17-108 |
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**REPLY COMMENTS OF CISCO SYSTEMS, INC.**

Cisco Systems, Inc. ("Cisco") respectfully submits these reply comments in response to parties' initial filings addressing the Federal Communications Commission's ("Commission's") *Restoring Internet Freedom Notice of Proposed Rulemaking* ("*NPRM*").[1]

As Cisco's initial comments emphasized, the American people would best be served by a return to fair, light-touch open internet protections grounded in the Commission's historically successful Title I regime.[2] The record assembled in this proceeding (not to mention the numerous prior matters considering broadband classification and Internet openness)[3] bears out the significant economic and social benefits that would accrue from a reversal of the 2015 *Title II Order*.[4] Cisco files this reply to focus on one particular issue: The importance of eliminating the blanket ban on paid prioritization.

As the world's largest supplier of network equipment and an industry leader in the provision of network management solutions, Cisco knows well the pro-competitive and pro-

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[1] *Restoring Internet Freedom*, Notice of Proposed Rulemaking, 32 FCC Rcd 4434 (2017) ("*NPRM*").

[2] *See generally* Comments of Cisco Systems, Inc., WC Docket No. 17-108 (filed July 17, 2017) ("Cisco Comments").

[3] *See, e.g.*, *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities,* Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798 (2002); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities,* Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853 (2005); *Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks,* Declaratory Ruling, 22 FCC Rcd 5901 (2007).

[4] *Protecting and Promoting the Open Internet*, Report and Order on Remand, Declaratory Ruling, and Order, 30 FCC Rcd 5601 (2015) ("*Title II Order*").

consumer benefits of traffic differentiation, including paid prioritization. The *Title II Order* bans internet service providers ("ISPs") from providing Quality of Service ("QoS")-enhancing prioritizing amenities, citing purported concerns regarding competition. A range of for-profit *non*-ISPs, however, continue to make functionally analogous QoS-enhancing products available – meaning that parties with sufficient capital are still able to benefit from paid traffic differentiation. All the *Title II Order* accomplished in this regard was to artificially diminish the number of actors able to *compete* in the market for prioritization. The reduction of competition in this arena only harms consumers and undercuts the public interest; thus, the Commission can and should reverse the *Title II Order*'s ban.

## I. TRAFFIC PRIORITIZATION IS – AND HAS ALWAYS BEEN – AN INEXTRICABLE COMPONENT OF THE INTERNET'S ARCHITECTURE

Both technical network functions and valuable internet ecosystem services already prioritize traffic by speeding its delivery to end-users – often, for a price.

### A. *De Facto Traffic Prioritization Already Occurs at Multiple Levels of the Network*

The internet has always relied on functional prioritization. First, on a technical level, basic internet functionalities act to accomplish the same ends as explicit traffic prioritization, providing differentiated QoS for edge products. For instance, caching and the domain name system ("DNS") work together to differentiate traffic speeds. As experts in the record have explained, caching accomplishes this objective by directing end-users' requests for specific content to different cache servers, the use of which is contingent upon the user's proximity to a given server and/or congestion. As a result, "content that would normally be delivered from a distant server … simply traverse[s] the ISP-to-user connection."[5] Thus, a user proximate to a

[5] *See* Peter Rysavy, *Declaration Regarding Restoring Internet Freedom* ¶¶ 15-18 (July 14, 2017) (attached to Comments of CTIA, WC Docket No. 17-108 (filed July 17, 2017) ("CTIA Comments")).

cache can access data faster, and an entity that can afford to locate its cache closer to bodies of users can guarantee superior QoS over less well-capitalized competitors who are unable to afford such caching. Similarly, DNS is "used to route content specific URLs to the nearest edge caching nodes," distributing "URLs to content servers that are nearest to the consumer."[6] Accordingly, "DNS servers … cache IP addresses and other data … to *reduce latency*."[7] Again, this acts to differentiate QoS.

Second, a range of non-ISPs, such as third-party content delivery networks ("CDNs"), offer products designed to speed the delivery of some content, creating differentiated consumer experiences in a manner that is, to the end user, functionally equivalent to traffic prioritization. As even the *Title II Order* acknowledges, CDNs "cache content close to end users, providing increased quality of service" for those companies who can afford a CDN's usage.[8]

Thus, QoS-differentiating technical functions and third-party services – which effectively prioritize certain traffic over other traffic from providers that cannot or do not avail themselves of such instrumentalities – are inherent components of the internet as we know it, and in many cases have been for decades.

### B. ***Compensated Prioritization Is Already a Market Reality***

Caching, DNS, and CDNs, moreover, are often either offered directly to edge providers for a price, or provided more generally as parts of product suites made available by for-profit companies. A host of CDNs specifically advertise on the basis of their ability to help edge

[6] Declaration of Philip Bronsdon at 19 ¶ 8(f) (attached as Appendix 2 to Comments of CenturyLink, WC Docket No. 17-108 (filed July 17, 2017; re-filed July 21, 2017)) ("Bronsdon Declaration").

[7] *Id.* (emphasis added).

[8] *Title II Order*, 30 FCC Rcd at 5687 ¶ 197. Likewise, the Internet Engineering Task Force's technical explanation of CDNs notes that said providers function specifically to "improve[] quality of experience for End Users." Internet Engineering Task Force (IETF), *Request for Comments: 6707, Content Distribution Network Interconnection (CDNI) Problem Statement*, 2012.

providers that pay them to prioritize data. For example, Amazon CloudFront boasts of its "optimiz[ation] for low latency and high data transfer speeds," "intelligent routing," and ability "to *accelerate the delivery of your content end-to-end*."[9] Similarly, Webscale highlights a customer statement that its "website *speed was immediately 400 times faster*, with page load times reduced from 9 seconds to 1.2 seconds"[10] and Yottaa advertises its ability to "[s]peed up your website" and "[i]ncrease online revenue" accordingly," while noting its service results in paying edge services experiencing "60% faster page loads."[11] Thus, it not surprising that content providers often maintain copies of their content in multiple CDN servers distributed in geographically diverse data centers[12] when they can afford to do so. Likewise, third-party DNS providers include such companies as Google[13] and Cisco itself.[14]

Ultimately, the services of all the above-named companies offer valuable contributions to the internet ecosystem. Their offerings all provide enhanced QoS management, repudiating allegations that the prioritization of traffic on the internet is *per se* harmful.

## II. THE *TITLE II ORDER* ARTIFICIALLY DIMINISHED THE NUMBER OF COMPETITORS OFFERING PRIORITIZING SERVICES

Despite protests to the contrary,[15] it is specious at best to distinguish traffic prioritization provided by ISPs from functionally equivalent services provided by others. As CDN Akamai boasts, its customers include "20 of the top global e-commerce sites, 30 of the top media and

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[9] Amazon Web Services, *Amazon ClouldFront*, https://aws.amazon.com/cloudfront/ (last visited Aug. 27, 2017) (emphasis added).

[10] Webscale, *Why Webscale?*, https://www.webscale.com/why-webscale/ (last visited Aug. 28, 2017 (emphasis added).

[11] Yottaa, *Accelerating eCommerce*, http://www.yottaa.com/ (last visited Aug. 28, 2017).

[12] Bronsdon Declaration at 19 ¶ 8(f).

[13] Google, *Google Public DNS*, https://developers.google.com/speed/public-dns/ (last visited Aug. 26, 2017).

[14] Cisco, *Cisco Completes the Acquisition of OpenDNS*, https://www.cisco.com/c/en/us/about/corporate-strategy-office/acquisitions/opendns.html (last visited Aug. 27, 2017).

[15] *See, e.g.*, Comments of the Internet Association, WC Docket No. 17-108, at 28-29 (July 17, 2017).

entertainment companies, 18 of the largest asset managers, 12 of the top insurers, 96 of the top U.S. retailers, [and] 9 of the largest newspapers."[16] Such an elite pool of corporate clients demonstrates the advantages deep-pocketed companies are able to access today, leveraging their resources to obtain third-party QoS management. As Cisco previously noted,[17] well-capitalized companies across all market segments are more likely to be able to sink greater amounts of investment into engineering network solutions to provide higher QoS than would-be disruptors can afford – meaning that, as one academic noted, "it may instead be the small innovative firms which need the possibility of prioritized access, because it does not require larger forms of up-front investments which they can ill afford."[18]

Thus, all that the *Title II Order*'s ban on paid prioritization accomplished was to limit the parties who can provide traffic management as a service. This result, of course, flies in the face of centuries of economic literature demonstrating the effects imposed by arbitrary limitations on competition. A legal ban that precludes one (and only one) set of providers from engaging in service differentiation inherently endows other segments with artificial opportunities to exercise greater market power.

Nor are the competitive harms that stem from banning ISPs from engaging in service differentiation limited to diminishing competition within the prioritization market. The *Title II Order* has created a status quo where dominant edge providers exert self-perpetuating pressure

[16] Akamai, *You Create the World's Best Digital Experience*, https://www.akamai.com/us/en/why-akamai/world-class-digital-experiences.jsp (last visited Aug. 26, 2017).

[17] Cisco Comments at 9-10.

[18] *See* Shane Greenstein *et al.*, *Net Neutrality: A Fast Lane to Understanding the Trade-Offs*, 30(2) J. of Econ. Perspectives 127 (2016).

on ISPs, given the latter class of actors' lack of opportunity to engage in market-based remedies to address QoS demands from producers of heavy traffic.[19]

## III. PERMITTING ISP COMPETITION FOR COMPENSATED PRIORITIZATION SERVICES WOULD BENEFIT THE MARKET AND CONSUMERS ALIKE

### A. *The Ban Harms Consumers Directly*

As the Cisco previously noted[20] and as the record reflects,[21] the *Title II Order*'s ban on ISP participation in the prioritization market directly harms consumers in a variety of ways.

First, the ban drives up consumer broadband prices, artificially forcing network service providers to recover all costs from end users rather than operating, where appropriate, under a two-sided market.[22] This *de facto* regressive subsidy amounts to a transfer of wealth from the economically disadvantaged to the comparatively rich by forcing users of more basic internet services not requiring prioritization to support the needs of those who demand low-latency services. Forced subsidies of this type are unjustifiable, especially in light of some edge providers' apparent gaming of the *Title II Order*-resultant status quo in their own favor.[23]

Nor do the ban's direct consumer harms end at broadband pricing. It takes no great leap of the imagination to picture a future Commission relying on the *Title II Order* to dub "free data" or zero-rated products a form of implicit traffic prioritization, putting at risk an entire product

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[19] *See, e.g.*, Nick Statt, *Netflix Admits to Throttling Video for AT&T and Verizon Customers*, Verge (Mar. 24, 2016, 8:26 PM), https://www.theverge.com/2016/3/24/11302446/netflix-admits-throttling-video-att-verizon-customers; Reuters, *Netflix Admits to Downgrading Video Quality on AT&T, Verizon Phones* (Mar. 24, 2016), http://www.reuters.com/article/us-netflix-videothrottling-idUSKCN0WQ2P0.

[20] *See* Cisco Comments at 12.

[21] *See, e.g.*, Comments of ITTA, WC Docket No. 17-108, at 5-6 (filed July 17, 2017).

[22] *See, e.g.*, Comment of Michael L. Katz, WC Docket No. 17-108 (filed June 22, 2017) (attaching a paper, *Wither U.S. Net Neutrality Regulation?*).

[23] *See supra* note 19.

class that "benefit consumers and encourage Internet adoption."[24] Forbidding free data – an especially harmful move for many historically disadvantaged consumers, who rely predominantly on mobile devices for access to the internet[25] – would, as Cisco previously explained, exacerbate the digital divide, and thus undercut core Commission policy objectives. Free data drives adoption, and lack-of-adoption is the greatest driver of digital inequality.[26]

Because broadband fuels so much of the American economy, the paid prioritization ban also exerts broader negative effects. As one commenter notes, even if the ban reduces the number of QoS-dependent telemedicine transactions by just five percent annually, the cost to the economy and to American lives would be immense.[27] As other commenters have rightly explained, the ban has "hampered creation of specialized, or prioritized services through which an operator could offer a guaranteed or heightened QoS for specific applications and services that depend on low latency … for optimal performance."[28] The ban thus risks delaying the improvement, even the deployment, of innovative consumer-benefitting services, whether these take the form of entertainment (*e.g.*, virtual reality, online gaming), life-saving instrumentalities (*e.g.*, the integration of virtual reality into telemedicine), or digital security (*e.g.*, the use of

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[24] *See* Comments of Christopher S. Yoo, WC Docket No. 17-108 (filed June 22, 2017) (attaching a paper, *Avoiding the Pitfalls of Net Uniformity: Zero Rating and Nondiscrimination*).

[25] *See, e.g.*, John B. Horrigan and Maeve Duggan, *Home Broadband 2015*, Pew Research Ctr. (Dec. 21, 2015), http://www.pewinternet.org/files/2015/12/Broadband-adoption-full.pdf.

[26] *See* Comment of Michelle Connolly, Clement, Lee, and Renhao Tan, WC Docket No. 17-108 (filed June 22, 2017) (attaching a paper, *The Digital Divide and Other Economic Considerations for Network Neutrality*) ("network neutrality regulation is more likely to worsen than improve the digital divide"); *see also* Lee Rainie, *Digital Divides 2015*, Pew Research Ctr. (Sept. 22, 2015), http://www.pewinternet.org/2015/09/22/digital-divides-2015/ (a majority of Americans who have not adopted the internet explain this is either because they do not find it relevant or lack digital literacy); *see also* Giulia McHenry, *Evolving Technologies Change the Nature of Internet Use*, Nat'l Telecomms. & Info. Admin. (Apr. 19, 2016), https://www.ntia.doc.gov/blog/2016/evolving-technologies-change-nature-internet-use ("low-income households that used the Internet at home were significantly more likely to depend on a mobile data plan than those with higher incomes").

[27] *See* CTIA Comments at 15-16.

[28] *See, e.g.*, Comments of Nokia, WC Docket No. 17-108, at 10-11 (filed July 17, 2017).

improved QoS to ensure maximum security of the most sensitive customer information).[29] It even threatens the future of 5G by putting network slicing practices at risk.[30] This last possibility is especially troubling in light of 5G's anticipated benefits, which include the addition of three million additional jobs to the U.S. economy.[31]

Thus, the ban on paid prioritization can only be construed as directly anti-consumer.

B. ***The Ban Harms Consumers by Harming the Market***

The data on the *Title II Order*'s indirect harms to consumers is also in; the *Order* has negatively impacted investment[32] and deployment[33] in a manner that threatens the literal underpinning of the entire internet ecosystem.

The ban on paid prioritization has, moreover, been especially harmful. As one neutral group of experts from the Institute of Electrical and Electronics Engineers has explained, allowing paid prioritization would actually *drive* deployment. An "ISP's optimal pricing [would] lead[] to an efficient differentiation among [content providers] *such that social welfare*

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[29] *See, e.g.*, *id.* at 10-11.

[30] *See, e.g.*, Comments of Ericsson, WC Docket No. 17-108, at 5-7 (filed July 17, 2017).

[31] *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, Accenture Strategy, at 1 (2017), *attached to* Letter from Scott K. Bergmann, CTIA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 16-421 (filed Jan. 13, 2017).

[32] One study surveying twelve leading domestic broadband firms shows a capex expenditure decline of $3.6 billion (5.6 percent) relative to 2014 levels; another demonstrates that from 2011-2015 the mere *threat* of reclassification reduced broadband investment by at least 20 percent, a $160-$200 billion loss in total – effectively costing the American consumer "an entire year's worth of telecommunications investment." And wireless capital investment fell from 18 percent of wireless revenues in 2013 to 14 percent by 2016, for a total wireless capital expenditure decline of $6.7 billion from 2014-16. *See* Hal Singer, *2016 Broadband Capex Survey: Tracking Investment in the Title II Era*, HalSinger.Wordpress.com (Mar. 1, 2017), https://haljsinger.wordpress.com/2017/03/01/2016-broadband-capex-survey-tracking-investment-in-the-title-ii-era/; George S. Ford, *Net Neutrality, Reclassification and Investment: A Counterfactual Analysis*, Phoenix Ctr. for Advanced Legal & Econ. Pub. Policy Studies (Apr. 25, 2017), http://www.phoenix-center.org/perspectives/Perspective17-02Final.pdf; Anna-Maria Kovacs, Regulation in Financial Translation: The Effect of Title II Classification on Wireless Investment 18-21(July 2017), *available at* http://cbpp.georgetown.edu/sites/cbpp.georgetown.edu/files/Kovacs%20-%20Title%20II%20and%20wireless%20investment.pdf.

[33] George S. Ford, *Broadband Speeds Post-Reclassification: An Empirical Approach*, Phoenix Ctr. for Advanced Legal & Econ. Pub. Policy Studies (June 27, 2017), http://www.phoenix-center.org/perspectives/Perspective17-07Final.pdf (showing that broadband speeds are already 10 percent lower on average than they would otherwise be, but for reclassification).

*is close to its maximum*" – indeed, ISPs "would have strong incentives to expand capacity under paid prioritization," as a method to recoup investment in light of the fact that "revenues from online services [are] growing more than twice as fast as those from Internet access."[34] When technical experts conclude that "[f]rom a welfare perspective … paid prioritization *could be superior to the imposition of net neutrality regulations*" for all of society,[35] the time has passed to eliminate the ban.

## IV. THEORETICAL, UNSUBSTANTIATED HARMS SHOULD NOT MOTIVATE PROPHYLACTIC REGULATORY INTERVENTION

As members of the Commission have wisely previously noted, a policy of "regulatory humility" is appropriate when the risk of regulatory intervention is to drive competitors from a given service market. This should, among other things, prompt the Commission to focus on "concrete evidence, not hypothetical harms."[36] Here, no concrete negative evidence has been presented demonstrating actual harm.[37] As former FCC Chief Economist Gerald Faulhaber has explained, "[e]mpirical analysis is required to determine, in any particular circumstance, whether paid prioritization is helpful or harmful. No such evidence has been produced, either in the literature or in the FCC order."[38] Therefore, the Commission can – and should – abandon the overly restrictive regulation of such practices.

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[34] Richard T.B. Ma *et al.*, *Paid Prioritization and Its Impact on Net Neutrality*, 35.2 IEEE J. On Selected Areas in Commc'ns 367 (2017) (emphasis added).

[35] *Id.* (emphasis added).

[36] *Ensuring Customer Premises Equipment Backup Power for Continuity of Communications et al.*, Notice of Proposed Rulemaking and Declaratory Ruling, 29 FCC Rcd 14968, 15038 (Statement of Commissioner Ajit Pai); *cf. Restoring Internet Freedom*, Notice of Proposed Rulemaking 32 FCC Rcd 4434, 4508 (2017) (Statement of Commissioner O'Rielly) (noting the need for "the Commission to ground its decision in facts rather than hypotheticals").

[37] *See, e.g.*, Comments of AT&T, WC Docket No. 17-108, at 39-46 (filed July 17, 2017) (detailing the baseless factual nature of complaints against paid prioritization); Comments of NCTA, WC Docket No. 17-108, at 5-6 (filed July 17, 2017).

[38] Gerald Faulhaber, *What Hath the FCC Wrought?*, 38(2) Regulation 50-55 (2015).

## V. CONCLUSION

Cisco remains fiercely devoted to the internet's continued openness. As we have previously explained, our business hinges on the free flow of data, and is built upon supplying equipment and services to all. However, as Judge Williams explained in his critique of the *Title II Order*, "it is hard to see how coach passengers or senders of ordinary mail are injured by the availability of speedier, costlier service."[39] The flat ban on ISP engagement in paid prioritization has generated real harms in order to redress unproven and unprovable allegations. The time has come for the Commission to remedy the 2015 majority's overreach.

Respectfully submitted,

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[39] *U.S. Telecom. Ass'n v. FCC*, 825 F.3d 674, 763 (D.C. Cir. 2016) (Williams, J., Dissenting).